— *The Political Science Quarterly* for June, 1889, opens with a study of "Municipal Government in Great Britain," by Albert Shaw of the Minneapolis *Tribune*. The article is based on prolonged and direct investigation, and goes behind the legal institutions to show their actual working. J. Hampden Dougherty describes the movements of the last forty years for amendment of the New York State Constitution, discussing especially the various projects for the reform of our city government. Frederick W. Whitridge writes on "Rotation in Office," advocating a repeal of the four years' law, which he regards as the basis of the spoils system. E. P. Cheyney of Pennsylvania University criticises from a social and economic point of view the decisions of the American courts on conspiracy and boycott cases. Professor J. W. Jenks of Knox College, Illinois, gives a history of the whiskey trust, and its effect on prices. The number contains the usual reviews, by specialists, of recent economic and political literature, and a record of political events continued from the last record published in the *New Princeton Review*.

LETTERS TO THE EDITOR.

A New Chemical Experiment

(which it would not be well to repeat very often).

LATELY, in my lecture to my class on phosphorus and its compounds, I made hydric phosphide in the usual way, by boiling phosphorus in a strong solution of potassic hydrate. That the class might see that phosphorus melted in an alkaline solution would remain in a liquid state after the solution had cooled, I left the pint flask containing the solution *in statu quo* until the next recitation. I had done the same repeatedly, but never before leaving it for so long a time as on this occasion, — from Friday until Monday. On entering the lecture-room on Monday morning, I observed the flask, and remarked, "All right, the phosphorus is still in a liquid condition;" and, mechanically taking up the flask, I gave it a slight shake, when it immediately exploded with a loud report, shattering the flask into minute fragments, and scattering its contents in every direction; the phosphorus, fortunately, instantly solidifying. So, save a slight cut on the wrist, I escaped without injury. It would be interesting to know if any one else ever experienced a like explosion, and the probable explanation of the explosion. A possible explanation is, that the gas had by adhesion become condensed around the phosphorus as the solution cooled, and that, the slight shake overcoming the adhesion, there was a rapid evolution of the gas. It would not be advisable to repeat the experiment without the face and hands and clothing were well protected. In this connection I would urge that it would be well if chemists, on noticing any like dangerous phenomena not laid down in the text-books, would publish the fact for the benefit of the brotherhood, to prevent serious accidents.

I well remember how near I came meeting with a serious accident from the explosion of a large piece of sodium thrown upon water; the old text-books, written when the price of sodium was as great as for potassium, thus rendering the former too expensive to use except in very small quantities, stating that sodium would not take fire like potassium. The explosion of sodium has resulted in the devising of that most brilliant of all chemical experiments, the ice-volcano.

It is not, perhaps, generally known that iodide of nitrogen, if left standing in aqua ammonia for twenty-four hours, will explode while wet; and even when freshly prepared, if partially dried and then scattered over the surface of a tank of water, it will for hours after repeatedly explode on slightly agitating the water. Many years ago I devised a method of exploding with safety a mixture of phosphorus and potassic chlorate, which I give for the benefit of the young experimenter. Place powdered potassic chlorate (no more than will cover a nickel, if exploded within doors) upon a board, and wet it with a solution of phosphorus in carbon disulphide (an inch of phosphorus will dissolve in an ounce and a half of carbon disulphide in a few minutes). In from five to ten minutes, or as soon as the mixture is dry, touch it with a long pole, or even stamp heavily on the floor, and a loud explosion will result.

A quantity sufficient to cover a dollar out in the air will shatter a thick plank, and make considerable of a hole in the ground. I have never experimented with large quantities, but presume that rocks might be thus shattered.

J. R. EATON.

Liberty, Mo., June 1.

Relative Frequency of Letters and Combinations.

IN a recent number of the *Phonographic World* a correspondent asks, "In English composition, (1) what is the relative frequency of the occurrence of the various letters of the alphabet; (2) in what proportion does each letter precede and follow each other letter of the alphabet; and (3) what syllables occur the most?"

In answer to the first question, it may be stated that in a font of type for printer's use, as supplied by type-founders, the different letters are usually supplied in about the following proportion: *e*, 1,200; *t*, 900; *i*, 865; *a*, 850; *n*, *o*, and *s*, 800 each; *h*, 640; *r*, 620; *f*, 450; *d*, 440; *l*, 400; *u*, 340; *c* and *m*, 300 each; *w* and *y*, 200 each; *g* and *p*, 170 each; *b*, 160; *v*, 120; *k*, 80; *q*, 50; *j* and *x*, 40 each; *z*, 20.

Some years ago I undertook to analyze 10,000 words of every-day English, from the editorial columns of twenty leading dailies, 500 words from each, selected from articles in which no undue prominence appeared to be given to any particular word. My object was to ascertain what combinations of two or more letters occurred with greatest frequency. My eyesight failed before my task was half completed; but the result of my labors, as far as they went, may be of interest in connection with the foregoing questions. In 3,500 words, as far as my analysis extended, I found that two-letter combinations occurred as follows: —

	Times.		Times.		Times.		Times.
th	605	is	175	as	111	me	89
in	314	at	173	it	111	ma	88
an	312	or	153	al	110	co	85
of	236	es	128	he	94	be	77
re	232	se	121	ha	93	le	77
er	227	ed	120	ve	92	pr	72
on	226	to	120	de	91	la	71
en	186	ar	117	ou	90	ll	70

This, of course, does not answer the questions asked, but the material furnished may be of some assistance to the inquirer, should he wish to pursue the subject further.

It may be added, that, in the number of words mentioned, the word *the* occurred 250 times; *of*, 180 times; *and*, 144 times; *to*, 79 times; and *in*, 74 times. 918 words occurred only once each, 163 twice, and 65 three times. The three-letter combination *the* (in *there*, *them*, etc., as well as alone) occurred 400 times; *and*, 172 times; *ing*, 114 times.

A very suggestive point to type-writer manufacturers and inventors is the fact that in all these words the letter *z* occurred but 8 times, while *th* occurred 605 times, and *the*, 400 times.

H. J. T.

New York, June 4.

INDUSTRIAL NOTES.

A New Photographic Lens.

THE Messrs. Beck have just turned out of their factory, and Morris Earle & Co., 1016 Chestnut Street, Philadelphia, have received from them, a new combination of their excellent lenses whereby one Iris diaphragm tube is adapted to carry three different sets of lenses, so that a photographer can take 4 × 5, 4¼ × 6½, and 5 × 8 views by means of adapting the three sets of lenses. Messrs. Earle & Co. have also recently received a new four-inch rectilinear, with Iris diaphragm, from the same firm, — the smallest lens they have ever turned out for photographers' purposes. This is meant to take lantern-slide negatives particularly, and is one of the finest lenses ever received from them.

A Beautiful Portfolio of Paintings in Water Colors.

The manufacturers of the well-known Scott's emulsion of cod-liver-oil are issuing the most beautiful portfolio of eight artistic studies (birds and flowers) that has ever come under our notice. This work is worth at least two dollars, but Messrs. Scott & Bowne, with their usual enterprise, have made arrangements